SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

ON RECENT IMPROVEMENTS FOR WORKING COAL WITH SAFETY AND ECONOMY.

Sir,—Having been permitted to look over the Powell Duffryn Collieries, near Aberdare, I may observe that they number twelve different establishments, eleven of which are now in operation—Lower Duffryn, two drawing pits; Middle Duffryn, Abergwawr, Cwmneol, Aberamman, Forch-amman, and New Tredegar; at each of these coal is raised to the extent of from 400 to 500 tons per day. At Old Duffryn, Abernantygros, and Cwmdare the quantity raised is about 160, 60, and 250 tons respectively. The High Duffryn pit is not at present worked, but the 7 feet seam is being opened out, since the three seams lying above have been exhausted. At the eleven collieries named as being at work coal is raised from the Four-feet, Six-feet, and Nine-feet seams, either from one, two, or the whole of them—these are all of the steam coal quality. The Four-feet seam at Middle Duffryn averages 5½ ft. in thickness, with a sound roof; this and the Six-feet seam produce stronger coal than the Nine-feet; the latter ranges from 9 to 15 ft. in thickness, including a band of 18 in. in it; the roof is an unsound one.

Lower Duffryn Pits.—The lower pit is 270 yards deep, and downcast. The winding-engine has two 26-in. horizontal cylinders, 4-ft. stroke, with plain drum, round wire-ropes. There is a 75-in. cylinder pumping beam-engine at this pit, and a hauling steam-engine underground. At the upper coal pit (also a downcast) the winding-engine has a 32-in. vertical cylinder, 5-ft. stroke, and flat wire-ropes. The produce from both pits is lowered by a self-acting incline to the Taff Vale Railway.

Guibal Fan.—The air pit near the upper coal pit has erected on it two of Guibal's fans, side by side, for the ventilation of both mines; they are 30 ft. in diameter, and 10 ft. wide; each is driven by a direct-acting steam-engine, having a vertical cylinder, going at the rate of 65 strokes per minute. All Guibal fans are provided with a cover, and an adjustable slide for regulating the egress of air into the chimney; the latter is made to expand upwards. By these means 60 per cent. of the steam-power used is utilised in the ventilation, and the machine is simple in its construction, rendering it liable to derangement in the smallest degree. The quantity of air obtained with one fan going at the rate named is stated to be 120,000 cubic feet per minute. When both fans are working together the quantity obtained is about 20,000 cubic feet more, under the same conditions; this is explained by the fans being too near, one interfering with the working of the other; and also, they do not show such good results above a certain limit of pressure, as indicated by water-gauge, as a piston-machine would do. In the latter case an increase in the size of air-ways would be required to diminish the friction and drag in the mine. The useful effect obtained from the Waddell fan is stated to be 40 per cent.; it is less expensive in its first erection, and is open at the circumference. The Guibal fan utilises 60 per cent. of the steam-power. Compared with a furnace at the depth of 500 yards, the saving in fuel in favour of the Guibal fan is stated by the inventor to be 50 per cent. Fans of this construction are now at work in this country 36 ft. in diameter and 12 ft. wide, one in Belgium is of 40 ft. diameter; so that when other advantages in favour of fans, as contrasted with furnaces, are taken into account, there is little doubt of the Guibal fan, more particularly, being extensively adopted for the ventilation of deep mines.

Chubb's Coal-Getter.—The Four-feet and Six-feet seams at Lower Duffryn are worked on the long wall system, with safety-lamps exclusively, and the coal either breaks down of itself or is brought down by wedges. The Nine-feet seam—where safety-lamps are used also—until lately was got by blasting with powder, but this practice has been superseded, and the coal is now extracted with the aid of Chubb's Coal-Getter or Coal-Breaker. One was in use in the mine, another was in the fitting-shop, at the time of my visit. The apparatus consists of a hydraulic ram, having eight pistons, of 2½ inches diameter, branching from it at one side; these can be made to act with a pressure of 3 tons per square inch, on the inside of an expanding slit tube, in which the lower part of the ram is placed; the expanding tube is about 4 inches in width internally. A hole is first bored in the coal by means of a screw and spiral drill, which is done by hand labour in about 20 minutes, to the depth of 4 ft. The expanding piece and ram are then placed in the drill-hole, when the pressure is applied on the pistons to the expanding piece, the coal is thus forced out in large blocks without any undercutting or holing. From what was stated, the apparatus gives great satisfaction, and there is every probability of its furnishing an equivalent in value to gunpowder, without its danger, and even that it will cheapen the cost of getting coal in many cases. Sir W. Armstrong, in his address to the meeting of Mechanical Engineers, in Newcastle, lately, observes—"For the relief of labour we must look to coal-cutting machines; for improvement of ventilation to exhausting fans; and for the superseding of horses to hauling-engines driven by transmitted power." The apparatus just described is one that is calculated to relieve labour to a great extent, and on the score of safety it cannot be too strongly recommended for trial or use in the mines of Lancashire, and, indeed, everywhere, when the use of safety-lamps and gunpowder are practised together. The mining interest will gladly avail themselves of the use of this apparatus, if it equals the expectations formed of it, as it would set aside one element of destruction in explosions of coal mines—the practice of blasting with powder.

Middle Duffryn.—The downcast, through which coal is raised, is 185 yards in depth to the Four-feet seam. At an air-pit near to it a Guibal fan is erected, 30 feet diameter, 12 feet wide, eight vanes, similar in other respects and in engine-power to those at Lower Duffryn. The quantity of air exhausted is 70,000 cubic feet per minute, going at the rate of 60 strokes. The Four-feet, Six-feet, and Nine-feet seams are all worked and raised at the drawing shaft. The Six-feet and Nine-feet seams are reached by a stone drift, dipping 1 in 6, and the coal is drawn through this drift by a hauling beam-engine, placed at the top of the pit. The winding-engine has two 25-inch horizontal cylinders, 4-ft. stroke, drum slightly conical: one tram raised in each carriage, holds from 18 to 26 cwts. of coal; about 500 tons per day drawn from the three seams. Cornish pumping-engine, with two forcing and one lifting set of pumps.

Compressed Air-Engines.—At the top of Middle Duffryn pit a blowing-engine is erected for transmitting power through pipes to the air-engines fixed in the mine. The blowing-engine was first erected for the purpose of transmitting power to coal-cutting machines; these have been abandoned, and the power is now utilised to working the hauling-engines. The blowing-engine has two 21-in. steam-cylinders, 2-ft. stroke; two 28-in. air-cylinders, 4-ft. stroke; motion reduced 3 to 1. The air pressure is 45 lbs. at the engine; one receiver at top, another at the bottom of the pit. There are four hauling-engines, with compressed air as the motive-power, placed underground; one has two 9-in. horizontal cylinders, and is placed 200 yards north of the shaft; another has two 9-in. cylinders, and is placed 450 yards north of the shaft in the Nine-feet seam. One has two 6-inch cylinders, and is 1000 yards west of the shaft; another has two 6-in. cylinders, and is 1400 yards north-west of the shaft. Each engine is furnished with two drums, but only the two larger engines use both drums; the small engines use one drum each, the others will shortly come into use, as there are 45 horses, besides, used for hauling down this mine. These are understood to be the first compressed air-engines applied to hauling underground; they are found advantageous in drawing coal up staples, or inclines, at some distance from the shaft, and the air brought to the engines from the surface through pipes after it has done its work is of service in cooling and assisting the ventilation. When a steam-engine is placed in like positions the steam is to be usually brought from the top or bottom of the pit to it in pipes, and the escape steam from the engine must be conveyed back again to the pit, or the nearest upcast through an air-way, generally at much inconvenience. If a portable engine and boiler are placed at a distance from the shaft the nuisance of heat and smoke is added to that of steam. When compressed air-engines are adopted the motive-power from the blowing-engine acts through the medium of pipes and the hauling-engine itself to produce a result which may be as advantageously obtained by a steam-engine fixed at the bottom of the pit, the boilers being in the same place, or the steam may be got from the top of the pit. The steam-engine can operate by means of ropes to long distances from the shaft; but, taking the length of rope into consideration, and the greater safety of compressed air-engines fixed and working at the precise points where they are required, the latter may in some cases be more economical and useful.

Method of Working the Coal.—The Four-feet and Six-feet seams are worked at Middle Duffryn on the long wall system, the roads or gateways are 14 yards apart; when driven 80 yards in length a new cross-heading is formed, and the old roads abandoned. The Nine-feet seam is got on the stall and pillar system. The double stalls—with a road on each side—are about 16 yards wide, and a pillar 3 to 4 yards wide is left between them; single stalls are about 8 yards wide, with a similar pillar; the length of the stalls is usually 80 yards, the breadth varies with the nature of the roof, which is more or less unsound. Davy and Clanny lamps are used throughout these collieries.

Abergwawr Pits.—One pit downcast 120 yards deep, through which coal is raised by a horizontal winding-engine, single cylinder, to the extent of 450 tons per day. Furnace ventilation is adopted at this colliery, the upcast pit is surmounted by a chimney. Another pit has been used for raising coal by water-balance, now stopped. Another pit used for pumping water, on which a Cornish engine is erected. These pits are all in close proximity. The remainder of the collieries are ventilated by furnace power, there being at each an upcast pit on which a chimney is erected, with the exception of New Tredegar, where the ventilation of Struvé has been adopted.

Screening.—The coal is brought from the workings to the screens in iron trams, having open spaces between the plates; 1 cwt. of small is allowed in each tram; this is weighed at the screens from each tram by a mechanical contrivance. The remainder, being large coal, runs into trucks holding generally 7 tons of coal, or into iron boxes holding 2½ tons each, two being placed on a carriage on the Taff Vale line. On the broad-gauge line, four of these boxes are placed on one carriage. When these boxes arrive at the shipping place they are removed and lowered into the hold of the vessel; the coal is discharged at the bottom, and breakage is thereby prevented as much as possible.

Struve's Ventilator.—Several of these machines are in operation in South Wales—one at Pyle, Cwm Avon, New Tredegar, and at Lletty Shenken Colliery, near Aberdare. The machine erected at Lletty Shenken has two air-cylinders of 18 feet diameter, and 7 feet stroke. Each cylinder, made of ½-inch iron, weighs 6½ tons, and works up and down in water between two concentric cylinders, 20 in. apart. There is a cover placed over the moving air-cylinder, which makes the machine double-acting, drawing and expelling air both at the up and down stroke. The contents of one cylinder inside, with 7-feet stroke, are 1780 cubic feet. This quantity expelled twice during the up and down stroke gives 3560 cubic feet; with 8 strokes per minute the quantity would be 28,480, and with two cylinders 56,960 cubic feet per minute. The quantity of air actually got in the mine is said to be 49,000 cubic feet, with the machine going 9 strokes. To each air-cylinder there are 192 valves, 21 inches by 12 inches, or 96 inlet and 96 outlet valves. The area of 96 valves together is 168 feet, and of the top of the piston or air-cylinder 254 feet. The machine can be worked up to 13 strokes per minute on an emergency, which would give 70,772 cubic feet of air. The machine is driven by a steam-engine having two 15-in. horizontal cylinders, 22-inch stroke, motion reduced 4 to 1. From the crank shaft motion is given to two beams, the working air-cylinders being attached to one end of each, and the connecting-rod, with weights to balance the cylinders, are fixed at the other end of each beam, giving the machine, as a whole, a clumsy appearance. The arrangement could be simplified by placing over each air-cylinder a steam-cylinder, working direct to the former, and at a greater velocity, at 12 strokes and upwards per minute. The air-cylinders might be built with wood, which would relieve the engine of the dead weight of the iron cylinder, and be more durable; the iron corrodes rapidly in the mineral water. Forty-five per cent. of useful effect is stated to be obtained from these machines on the steam-power used.

Economical Considerations.—From the foregoing observations we conclude that there is a great saving of fuel when ventilating machines are adopted. They are relatively safer than furnaces, and will often save the cost entailed by accidents; and in practice large quantities of air are obtained with them, meeting the requirements of extensive mines. Coal should be worked on a system which will produce the maximum amount of large, whether cutting machines or hand labour is used; the former possess advantages in this respect, and in reducing somewhat the cost of getting coal. The use of engines for underground hauling instead of horses is always attended with advantage, saving, according to circumstances, more in some cases than others. With engines moved by compressed air an advantage would, no doubt, be gained by making them portable, and capable of being moved from one place to another at little cost.

Aug. 10. M. B. Gardner.

UNDERGROUND HAULAGE OF COALS.

Sir,—First, with respect to transmitting the power to different points, so as to enable the miner to work in different directions by various planes, either to the dip or rise. This is effected by fixing a clip-drum at the termination of the first plane, instead of working a plain sheave, the latter being used when it is not required to proceed further with engine-power. To this clip-drum a vertical shaft is fixed, and by means of bevel wheels the motion is transmitted to an ordinary drum, on which is wound the rope used in working the plane beyond. This mode is particularly applicable when it is required to work a *dip* way, and the plane has sufficient inclination to take the rope off the drum, a brake being applied to regulate the speed, and the drum being then connected again with the clip the load is brought up the plane by its action. But a rise plane can also be worked similarly, the *empty set* being drawn up by the action of the clip, and the full set taking the rope off the drum. To those who have paid any attention to the mode of working with the endless chain it will be apparent that there is a great similarity in the modes of working different planes in different directions, by the use of the clip-drum system and the endless chain. It is evident that whatever can be done with the latter can also be effected by the former, for where it is required to work in another direction, and also necessary to haul the trams in both directions alternately, a double clip can be used, the direction being changed by bevel wheels provided with clutches, so that either drum can be worked alone, or both at one time, as required, so that the only difference between the action of the clip-drum apparatus and that of the endless chain consists in the mode of hanging the tubs on; and this point is undoubtedly in favour of the endless chain system, so far as the expenditure of power is concerned; but, on the other hand, greater speed and facility of action is certainly got by means of the clip-drum and endless ropes, or ropes applied in the ordinary way.

It is hardly necessary to report here that much less power is required in working certain planes by means of a clip-drum than is required when the same planes are worked by the ordinary drums; and if we suppose that it is possible or practicable to hang the tubs on to the rope in the same manner as they are put on to the endless chain, a further great advantage would be gained in planes where certain gradients prevail, so far as the powers required is concerned—that is, where the gradients are in favour of the full trams in coming out, and it may, therefore, be worth enquiring whether the tubs can be put on to the wire-rope in a similar manner to the mode used in case of the endless chain—that is, by hanging the tubs on singly at certain intervals—and there is no doubt that this might be effected by using a "clam," which could readily be attached and detached.

Power is often transmitted to a distance for the purpose of pumping by means of clip-drums, and they are admirably adapted for this purpose. An engine may be fixed in any position for this purpose, either on the surface or underground. When fixed on the surface a clip-drum is, of course, worked by the engine, and the rope taken down a vertical shaft or sloping plane, as the case may be; and where it is required to pump, a second clip-drum is fixed, and the rope is, of course, passed round both clip-drums. The pump-rods are attached to the shaft, on which the clip-drum works by means of cranks, and double-acting pumps are generally used, but any kind of pump can be worked. In mines a portable pump is often used, placed on a carriage, and this is very convenient and useful, as it can be readily moved forward as the exploring drifts advance. It will, perhaps, be readily acknowledged that this arrangement of wire-ropes and pulleys is much more readily applied and worked than the system of wooden guides, formerly generally adopted, and especially so when it is necessary to work pumps at considerable distances from the engine.

Newcastle, Aug. 11. M. E.

THE SOUTH STAFFORDSHIRE AND SHROPSHIRE COAL FIELDS—No. X.

Sir,—The views as to the denudation of the South Staffordshire and Shropshire coal fields advocated by me in the *Mining Journal*, and embodied in a paper read before the South Midland Institute of Mining, Mechanical, and Civil Engineers, came on for discussion before the members of the Institute last week, but the Council having ruled that such discussions should not be published till the end of the year, objections and answers will not, of course, be reported. The former, I believe, so far as at present stated, consist of the following:—First, if the coal measures between Shropshire and South Staffordshire were denuded, what became of the material so removed? Secondly, whence were the materials derived to supply their place? And, thirdly, as the South Staffordshire and Shropshire coal fields have been elevated by igneous forces at either extremity of the basin, is it not reasonable to expect the disrupted coal seams to be intact beneath the red rocks, awaiting that capital and enterprise alone necessary to bring them to the surface?

In reply, it might be said that in neither of these objections is there any great force, and that each has been answered in your columns already, so far as the advocates of the theory are bound to answer them. It has been shown that specimens of the Top coal, obtained from the denuded edges of seams, abutting upon the Symon fault, when brought to bank, have the sediment of the water which eroded them still attached, which sediment at the Kemberton pits may be traced to the "Strong Binds," which immediately succeed that measure, and which is 48 yards in thickness. It has been shown, too, that bits of coal wrenched off had become the sport of waves, which had worn them into pebbles, and that these, with other eroded materials, lie around or upon the denuded seams; also that there are a series of bastard measures in and around the Shropshire and South Staffordshire coal fields, which there are good reasons for believing belong to this transition period, and which are, in fact, the reconstituted rocks of the coal measures. The reply to the first objection implies an answer to the second; but it may be said, in addition, that coal being brittle and light, would be ground up and removed to a distance, whilst heavier materials would settle down not far off, and might even have been brought back, together with some of the washings of the cornstones and other portions of the Old Red, now laid bare and exposed to the waves on the borders of the coal fields.

To the third objection it is sufficient to reply that it has no force, inasmuch as these faults are not those of disruption, like others in

the two fields—not clean-cut faults in which the measures are severed vertically, but faults where they disappear in succession by a series of broad steps, the lowest stretching out the furthest. We have already given one or two instances in which they thus disappear in the north of the field, and we add an instance in the south, as supplied by a practical man familiar with the measures. We do not pretend that the distances are in each instance strictly accurate, but we believe them to be so on the whole. At the foundry, for instance, midway between the Town Hall and the Church, Broseley, the Top coal terminates, whilst the Bottom coal extends 30 yards further, and then terminates too. The Penneystone runs 200 yards, and terminates near the Foresters' Arms; the Vigor coal 5 yards, and the Gancy coal 100 yards beyond the latter; the Clod coal 30 yards further than the Best, and the Little Flints 60 yards further still. This would give us 152 ft. of lineal, and 1575 ft. vertical strata, with a slope of 1 in a little over 10. But in reality the slope is not so great, because an anticlinal fault of Amystery limestone throws out the lower measures near the Dunge, whilst they come in again on the other side, and continue to Caughley (1¼ mile beyond the Foresters' Arms), where the Spirorbis limestone and the two accompanying coal seams, so characteristic of the younger formation, have been deposited above the well-known lower measures on the border of the old field. Beyond Caughley, however, all trace of the lower coals is lost, and the younger measures, with the Spirorbis limestone, come in upon the Old Red Sandstone, which, after continuing unbroken from the South Wales coal field, here thins out to a wedge. And here occurs one of the most interesting natural sections anywhere to be found, within the same compass, in the kingdom. On one side are the Permians, dipping rapidly away from the younger coal measures, and on the other is the Old Red Sandstone, with its passage beds conducting us down into the Downton sandstone, which appears on the Dingle sides, and again in a narrow gorge near Linley Hall, and the Downton flags beneath, leading to the Amystery limestone, which crops out in the bed of Darley brook, close by. From this upper bone bed I have extracted some of the largest spines and rib-bones yet discovered. Among this fish-fauna Sir Philip Egerton has distinguished Plectrodus, Onchus, Ctenacanthus, from specimens which I have supplied; and I have since, on several occasions, found remains of the Pteregotus, and those of one or two other species. The Downton sand and claystones contain remains of Theolodus, hosts of Beyrichiæ, Lingula cornea, Modiolopsis, Complaneta, and other shells.

Madeley, Aug. 10. —— John Randall, F.G.S.

THE MESSRS. HINDE'S NEW SYSTEM OF IRON AND STEEL MAKING—THE QUESTION OF THE AGENCY OF NITROGEN IN CONVERSION—STEEL-MAKING IN CLEVELAND.

Sir,—I resume, with your permission, my review of the Messrs. Hinde's New System of Iron and Steel Making. The interval between my last and present article will not be deemed too great when we consider the gravity—I might say the grandeur—of the occasion. It is to be remembered that the Messrs. Hinde's ambitions are not restricted to the revolutionising of some one merely isolated or detached portion of the great iron and steel manufactures. Their ambition overtops and stretches over the whole superstructure of this big industry. They go in for the whole pig. Their scheme comprehends a total remodelling of operations and arrangements which have taken up, if they have not exhausted, the skill and energy of several generations to create. They would level with the fields every blast-furnace that rears it blatant and presumptuous head above the surface of the earth. They would pull down every puddling-furnace that dishonours their higher intelligencies. They would transform that amiable and disinterested class of people called "puddlers" into agricultural labourers. They would give them the sun and moon, instead of terrestrial "heats" and "mottled pig," to swear at; and Hereford swipes, instead of Middlesborough eight-penny, to drink in future. They would teach Hallamshire to swear, henceforth, by Fownhope, and not by Dannemora. The vast material organisation of the British iron trade, with all the stupendous interests attached thereto, and all the interests of every other iron manufacturing country which either rivals or emulates England, these gentlemen would utterly demolish, and that, too, at one fell swoop. The exploit of the two bantams (in the Yankee legend) that essayed from the opposite sides of those broad waters to crow down the thunders of Niagara was scarcely a bolder exploit than that which is aimed at by these adventurous gentlemen.

Still is it within the range of possibility that the Messrs. Hinde may not, after all, be so very far wrong. Their shaft may be aimed in the right direction, though it fails to touch the bull's eye, or misses the target altogether. We should guard ourselves against indulging in that miserable shortsightedness—selfishness concreted into blindness—which perceives in every existing condition of things beyond which our own vision does not penetrate the best of all possible conditions. Everyone is accustomed to hear astute ironmasters and energetic managers, for example, declare that even puddling was (and will for ever remain) a perfect master-stroke of inventive genius. But so to reason seems to be an especial attribute of that very useful human compound of imaginative and speculative weakness and strong physical energies called the "practical man;" that is, of him who (according to Arthur Phillips) is "one whose range of mental vision is limited to the length of his nose, and is weak in proportion to the stuntedness of that organ, as is his fineness of touch by the thickness of his fingers." But, nothwithstanding a prevalance of affirmations of this kind—that we have attained perfection—there is, indeed, much to be done, and much need is there for the doing of it both well and speedily, by whomsoever that doing shall be accomplished. In this 1869 we indulge in monstrous entities, called blast-furnaces, possessed of huge appetites, and of wonderous digestive powers, but very apt to go wrong, every now and then, in their lungs and intestines, and to exercise fantastic secretionary powers, and emit very abnormal and unlooked-for excrements. We glory in puddling-furnaces, whose great excellence seems to lie in a propensity to bungle their own special work—to consume themselves, and to roast their co-operative victims, the puddlers, into a foretaste of perdition. Some few years ago people in this non-technical England were spending money over futile attempts to manufacture "puddled steel" by such schemes as that of one Reipé—a German. A few weeks ago we witnessed the breakdown, hereabouts—in Cleveland—of an equally futile scheme for steel-making; a plagiarised and re-imported project of another foreigner—one Martin, a Frenchman. In the midst of all this, and of the clamorous want it indicates, we have the advent of the Messrs. Hinde's prophetic announcements. We naturally ask in what coming year hence shall we cease to keep and feed such monsters as our existing appliances are, cease to make efforts so pitifully abortive as we now do, and get palpable possession both of better knowledge and of those more tractable creations with which to do our work that are promised us by these high intelligencies? As yet, however, we have no palpable evidences of even the approach of this ferruginous millenium.

Diving into the Messrs. Hinde's voluminous exposition in search of the original and profound, or of any other thing of a value commensurate with the loftiness of their designs, I encounter the following remarkable passage. It occurs (see page 12 of Reprint from the *Mining Journal*) in that part of their essay which treats of the methods hitherto and now in use for the production of pure or malleable iron. They say—"If operating on a sound principle (they are speaking of the principles involved in these operations), practice and experience, from time to time, will have suggested such improvements in the details and modes of carrying it into effect that we may expect an approximately satisfactory result to have been achieved; but if, on the contrary, the principle itself is unsound, then no improvement in details can possibly rectify the original error, and the position resembles that of a man arguing from false premises—his conclusions must necessarily be wrong." Now, through this extract from their essay, and on the *ex pede Herculem* principle of judging of the whole by the evidences of a fragment, I am led to conclude, *ab initio*, that the Messrs. Hinde are young (I do not say green) in the art and practice of philosophical disquisition. We scarcely look in a modern treatise on a metallurgical topic, or in an amplified specification of a patented invention, which is, in fact, what the Messrs. Hinde's essay amounts to, for a set recapitulation of any of the most elementary principles of reasoning. Their tools, and the handling of them, are obviously new things, and create new sensations in these gentlemen. They are proud of their instruments, and, like all novices, love to exhibit them. Out of a simplicity so excessive one wonders how there can spring "a system now available, based upon scientific principles, in accord with the fixed and incontrovertible laws of chemistry" (this is Messrs. Hinde's own description of their system and its coming achievements), by the adoption whereby every other existing system will wholly pass away, and there will be left only the legend that such a thing "once formed a part of the metallurgical industry of Great Britain." (See their Reprint, p. 18.) The trite moralisings of old Mrs. Trimmer, with which Sydney Smith, in a past time, so much amused himself, were of the same type as the above antiquated truism about an unsound principle, its details, and the result of a man's arguing from false premises, &c. A juvenility and chaffiness so great as this extracted and very curious sentence betrays give one little hope of finding many corns in even the whole bushelful. Conclusions in their effects so detractive, and a philosophising so disproportionate in its depth to the work in hand, when taken along with these gentlemen's antiquarianism in the matter of steel and diamonds, and the jumble of balderdash—a compound of spurious chemistry and wretched experimenting—which has been babbled and accepted as most profound science by a past generation or two; the facile gullibility they exhibit on the steel and nitrogen question; the simplicity of their belief as to the real functions of cyanogen in steel conversion as those topics are handled at the Inventors' Institute, and as the nitrogen question has since been illustrated by Dr. Phipson (see *Mining Journal*, pp. 167, 183, 219), and which handling Mr. T. C. Hinde styles the "latest expression of English science thereon," all lead one to conclude that these gentlemen are, for their philosophical sport, habituated to fish in only very shallow waters, running through long-worn channels, and over rocky bottoms, but with, perchance (we would hope), a deepish pool, and a good fish or two here and there in the course.

None of your readers would be so very impious or so weak as to expect the Messrs. Hinde (however talented in other matters) to "create" any new natural law, physical or other. But I did hope to find that they had discovered the existence of some law not known previously, or had, at least, made some novel and valuable application of one or more known laws—the former thing (as everyone knows, and Mr. T. C. Hinde also should know) being called discovery, and the latter invention. Wherever these things are absent a proper expression for such a defect is "a lack of originality." I am sorry to say that so far, at least, I have found neither the one nor the other of such triumphs of intelligence in their extensive exposition. I have taken infinite pains, and have "used up" both their essay and myself in the search. I have toiled up to the summit, and peeped into their huge crater, but only to find out at last that there is "nothing in it."

But this I must proceed further to demonstrate. My last review showed so far that the Messrs. Hinde's formulæ of operations for the accomplishment of their great work consisted of the adoption of one or two exploded chemical doctrines to be found in the old encyclopædias, of a few well-known laboratory experiments magnified into manufacturing operations, and a projected scheme of handling their materials, of so delicate a character as to amount to a physical impossibility. It is seen that all this is mixed up with much trite classroom reasoning about the physical condition of our English ores; about the necessity for an intimate mixing together of the ores and other materials in their reduction; and about the rationale of some very ordinary chemical reactions. I pointed out, moreover, that along with all this and throughout, by way of jubilant accompaniment, there runs a great clashing of cymbals.

I come now, in further searchings, to a consideration of what, to myself at least, appears to be a great fallacy pervading the whole of the Messrs. Hinde's projected operations, and to which fallacy I alluded in my last article:—

1.—To get malleable iron under their system, or steel iron, or malleable steel of the Bessemer type, or steel proper, they must have an abundant command of carbonic oxide, and that unmixed with free oxygen or with carbonic acid.

2.—The presence of either uncombined oxygen or of carbonic acid is fatal to the condition of the metal which, in the above cases, they seek to attain and secure. (Procuring their carbonic oxide by means of atmospheric air plus carbon, it will, of course, always be mixed with free nitrogen, and it is this mixture which is to be hereafter understood as being indicated when carbonic oxide is referred to.)

3.—The carbonic oxide which they would employ must also be of the very highest temperature. But, by no existing or known process, nor by any which the Messrs. Hinde indicate, can carbonic oxide in this condition of complete freedom from oxygen and carbonic acid, be procured, and be, at the same time, of the high temperature required for their purposes; that is, it cannot be had so economically as to be admissable into manufacturing operations.

4.—By no method yet pointed out can the Messrs. Hinde so rightly adjust the proportions of carbon and iron, or secure its entire absence, which are necessary to attain their results, or to procure malleable iron. If free carbon be added to the iron oxide, in order to reduce any oxygen or carbonic acid present in the gaseous fuel to the condition of protoxide of carbon, the exact adjustment of the quantity of such carbon is so delicate an operation as to be practically impossible. If too much carbon be left after the reducing action has been accomplished, then the metallic product will be neither malleable iron or steel. If too little carbon be used, the metallic product will be contaminated with oxide of iron, and as such will be an imperfect, if not a valueless, product—certainly not any one of the kinds of metal these gentlemen aim to produce.

5.—The gaseous fuel—carbonic oxide, mixed with nitrogen—which the Messrs. Hinde will get will reduce oxide of iron to the metallic state, but will fail in temperature to melt their product; and, of course, if it fail to melt steel, or even the less highly carburised iron, it will be utterly impotent with malleable iron. How, then, will they run off their metal clear from the silica or silicates? And as the heat required to fuse the silicates, so that they themselves shall be cleared off from the reduced iron or steel, is greater than that required to melt steel, how, we ask, will they manage their work? The melting point (giving this and the following as approximations and comparative only, for they have never been accurately determined experimentally), containing about 4 per cent. of carbon, with other impurities, is about 2700° Fahr. The melting point of cast metal containing only about 2 per cent. of such matters comes up to 2900° Fahr. That of ordinary steel, with about 1 per cent. of azolised carbon in it, is 3300°, or more. That of steel proper lies between 3500° and 3800° The exact melting point of pure or malleable iron is practically unknown, but it is an error to assume it to be infusible.

6.—The heat given out by the combustion of carbon or oxygen gas (say, in atmospheric air), reaches the maximum of such an evolution when carbonic acid gas, and not when the protoxide, is the product. In any ordinary arrangement where such a combustion occurs, and the hot carbonic acid has to be reduced to carbonic oxide, and the heat for this purpose is provided by the hot carbonic acid itself—that is, by convection—the reduction of temperature that ensues is necessarily very great. There come into play the actions of the laws of conduction and of radiation, those of specific heats and of temperatures resulting from mixtures of different bodies of unequal temperatures, and put together in unequal quantities, as in the case of the convected heat of the carbonic acid when acting on the contiguous and comparatively colder carbon.

Those of your readers who are familiar with considerations of this kind will readily perceive what must be the condition, as to temperature, of the gaseous mixture which the Messrs. Hinde will get, and with which they expect to work their miracles. It follows that the Messrs. Hinde cannot, by any plan which they point out, get their most important power—their gaseous fuel and reducing agent—of the high temperature requisite for their work. They must raise up the heat of their carbonic oxide much beyond the heat at which they obtain it. And so to raise it they must pass the gaseous mixture through some highly heated medium, as white-hot tubes, made hot by external heating, or bring it in contact with highly heated surfaces on the so-called regenerative system, first proposed, of old, by Stirling, and since so well carried out by Siemens. But under the former plan of raising up the heat of their gas, the cost of so heating it will ruin the operation. Whilst under the latter expedient they will have to encounter toll-bars, in the shape of existing patent rights, which will stop the way. Another expedient is open to them—to re-burn their carbonic oxide by the admission to it of atmospheric air after its production, and just before it is made to impinge upon their mixtures. This addition will, of course, add to the temperature the heat given out by combustion, minus the cooling action of the moisture of the comparatively colder volume of air. But this, too, will fail them, and ruin their work, for carbonic acid is the product, or part product, and the presence of that compound is fatal to their process.

If the Messrs. Hinde would only carefully study these things they would perceive how difficult is the task they have set themselves. And if, moreover, in place of teasing themselves and your readers with old Guyton-Morveau and his diamond dust, they would but take kindly to nitrogen (which has done them no harm), it is possible they might discover how to make steel after all. But they must approach the solution of this problem in a different spirit from that hitherto exhibited. Like the acolytes in chivalry of old, they have a long novitiate to pass through before they acquire the right frame of mind and the true philosophical animus. I venture to predict that before long we shall see the Messrs. Hinde rushing, red-hot, into patents for securing the co-operation of nitrogen in their attempts at manufacturing the "Steel of the future."

An Iron Smelter and Would-be Steel Maker.

Eston, Cleveland, Aug. 10.

[*To be continued in next week's Journal.*]

THE CHANNEL PASSAGE.

Sir,—In reply to a letter, appearing in the Journal of July 31, signed "A Miner," I beg to state that I have not written, nor do I desire to write, anything against the Tunnel, which, if superior to the Bridge, I should be glad to see carried out. All I desire is to prevent any misrepresentations being made to the prejudice of the Anglo-French Bridge Company.

For this purpose I have corrected the statement which some of the papers have reported as having been made by the deputation to Mr. Bright, that the French Government approves of the Tunnel, and is waiting for the English Government to join in a guarantee in respect of it. Capt. Tyler's report shows this cannot be the fact, as he recommends the English Government to refer the whole matter for the consideration of the French Government, whose opinion of M. Boutet's Bridge project is thus referred to in Capt. Tyler's report:—

"Of the various projects, those which have of late made the most progress are the Bridge scheme of M. Boutet, and the Tunnel scheme; and further—

"In the case of M. Boutet's Bridge scheme, an association has been formed for making experiments, two small bridges have been built in France, and arrangements are made near St. Malo for a third, a mile in length, to be constructed in two spans of half a mile each. The Emperor Napoleon visited the works of M. Boutet, on a site which has been granted by the French Government, on the 8th instant, and his Majesty is stated to have expressed himself favourably with regard to the project.

"This Bridge is intended to cross from Dover to Blancnez, and is advocated in a paper forwarded on the 27th June to the Board of Trade, as (1), being less costly than a Tunnel; (2), occupying less time in construction; (3), giving no trouble in ventilation; (4), avoiding the danger of sudden inundations."

Capt. Tyler states that he has not been able to convince himself of its feasibility, but it is difficult to see how he could do so without the plans, which are not yet published. Henry Stead, Sec.

THE WELSH SLATE TRADE.

Sir,—Referring to the letter on this subject published in last week's Journal, I may say that a more evasive epistle was never penned upon any subject opened for discussion. I should not, perhaps, have noticed the article at all if some of its statements had not been so monstrous and untrue. I can agree with your Correspondent when he says that it is difficult to obtain perfectly accurate statistics of quarrying, but there are opportunies for gaining them approximately, and at least within a few thousand tons, as well as their money value, he says, and allows that means are extant for procuring an estimate *under*, but not over the *mark*. Now, Sir, if that be the case, why is he so much over both in produce of slates and their value, as well in his estimate of the profits; but supposing his figures were true, and which they are far from being, both as to the produce and market value, the profits he names would be equally erroneous; there are other expenses he omits to name, amounting to a good percentage on his so-named profits. He says that I should have objected to some statements which appeared in the papers a month or two since. I beg to tell him one reason is that I saw no such statements, and should be glad, if he would now specify them, that I may take the opportunity, which I know will be readily afforded in the *Mining Journal*, to refute them. —— One Interested.

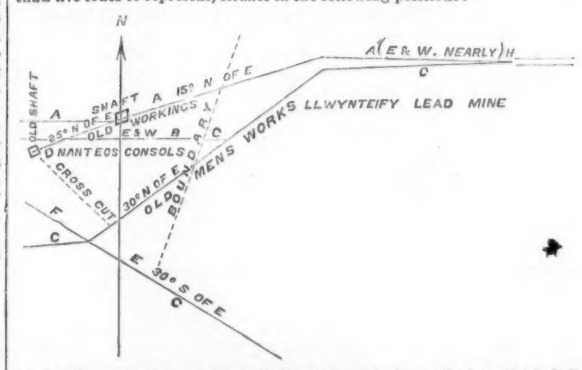
MINING IN CARDIGANSHIRE—No. I.

ON THE JUNCTION OF LODES—THEIR INFLUENCE AND EFFECTS.

Sir,—It has occurred to me that if our practical men would publish in the Journal some of the events that have really occurred in their experience, such as I purpose doing, it might possibly lead to some good results. I, therefore, now hand you the result of what has taken place where the junction of lodes, as they will be here described, have been laid open and worked on. In order to give a more clear idea than I can express by words, it will, I think, be necessary to give you a rough plan, so as to illustrate more clearly my meaning, and it will, undoubtedly, assist your readers as well.

Let it be thoroughly understood that in sending you this I am not to—in fact, I will not—be led into a long matter of discussion on the subject I am treating on, but that I merely give to you and your readers the result of my observations and experience in this county: and I trust that some one who may be more able to wield the pen, and with greater ability, and whose experience has been longer than my own (30 years), will be induced to give us some information on this important subject, from their own experience in different parts of the kingdom; if so, it will undoubtedly receive that attention from your readers which it demands.

I will first begin with the Nantros Consols, which is situate just in the centre of the county, and I will take the eastern part of that sett, and also the adjoining sett of the Llwynteify Lead Mine, and in doing so I find we have no less than five lodes to represent, situate in the following positions:—



We first began to clear an old shaft, the most westerly, marked on the lode D, this we found to be 16 fathoms deep from surface, with a cross-cut leading into the lode C. This, it is proper here to state, was the old miners' adit, which has never been touched before the present working by any man now alive, neither is it ascertained when this work was done. On getting down to this adit we found that the adit had been extended on the lode marked D, running 25° north of east, and forming a junction with the lode marked A, running 15° north of east. At this junction we cleared up a shaft and some old workings, where we found a course of ore on the lode A, 2 feet wide, solid, besides other ribs, varying from 6 in. to ½ in. in thickness. At the junction the lode is from 8 to 10 ft. wide, and at the present depth the vein, in addition to the ore described, contains a great quantity of carbonate of lead, sulphuric pyrites (this is caused most undoubtedly from the influence of the lode D, as that lode always contains a large quantity of that mineral), gossan, and sugar-spar. How far this course of ore extends east and west we have yet to ascertain, as the workings have been only cleared some 25 fathoms in length. The lode D is 6 feet wide, composed of sulphur, gossan, quartz, and prian: it has a most promising appearance, but at the depth opened on does not contain lead ore in paying quantities. At the junction the lodes A and D run on together eastward, and do not cut through each other.

Such a course of ore as the one described is not often met with, and, therefore, we cannot but conclude that two lodes running and joining each other in the direction indicated is most favourable for the production of a great course of ore. The lode A stands entirely in whole ground through the western part of the grant, a distance of more than 300 fms. We will next take the junction of the lode E, running 30° south of east, and forming a junction with the lode C, running 30° north of east. It will be seen by the sketch that at this junction the lode C changed its direction greatly, running almost west to the west of the junction, but to the east running 30°, or nearly so, to the north of east. To the west there is a long run of ore ground, more than 100 fms. in length, which has been taken away at about 5*l.* 10*s.* per ton, but sometimes more has been paid

than this. To the east of the junction there has been a course of ore worked by the old men a century ago, as deep as they were enabled to draw the water and the stuff; and from the old pumps seen, and the evident great exertions put forward to work this piece of ground, there is no doubt that they had a much better course of ore eastward than they had westward. This will now be proved, as we are driving a level which is within 5 fathoms of reaching this ore, which will leave us a back of 20 fms. on it. At some future time I hope to be able to give you more clear evidence on this. The junction of the lodes D and B were unproductive at the depth seen; but the junction of the lodes B and C was the means of again forming a course of ore further east on the lode C. I believe in going eastward the lodes B and C form one, and traverse the hill together, as did the lodes D and A at their junction. It would appear, therefore, that the junction of the lodes E and C is favourable for the production of lead ore, but not so much so as the junction of the lodes A and D. The same remark would apply to the junction of the lodes B and C. We have now one more junction of lodes to treat with, and that will be with the lodes A and C, eastward at the point marked H. This junction will be proved by a deep adit level, started at no great distance from the River Rheidol, so as to come in at the point H, at a depth from surface of 30 fms.

We have seen (and I have described all the things as accurately as I could) what the results of the other junctions have been, and we have now to consider what we may reasonably anticipate from the one now describing. We have two as fine lodes as the county can produce, both of them very rich and productive westward, and carrying a most beautiful gossan at surface, and running in a most favourable direction for producing large quantities of ore, and the junction of the lodes, in my opinion, more favourable than either of the others described. I, therefore, do not hesitate to express my opinion that one of the greatest discoveries yet made in this county will, ere long, be made in Llwyntelfy deep adit.

Next week I intend giving you the particulars of the junction of the lodes at Powell United Mines, and to follow the subject on for some weeks to come, if you and your readers do not get tired of inserting and reading.

Goginan, Aberystwith, Aug. 9. —— ABSALOM FRANCIS.

ROYAL MINES, &c.

SIR,—On the 4th of this month, in the House of Commons, Mr. David Williams, M.P. for Merioneth, gave the following notice:—

"Address for return of all gold, silver, copper, and other ore and mineral substances raised in Wales under Crown licenses, or under any leases or agreements, or promise of a lease, and the amount of rent, royalties, reservations, &c., paid under such licence, lease, or agreement since April, 1854, with a description distinguishing those from which the Crown receives rents and royalties claimed by virtue of its prerogative from those claimed as 'Royal Mines,' or as some of the same in fee simple, together with a statement of the manner in which the Commission in charge of the Land Revenue of the Crown deals with persons desirous of searching for gold and silver in the United Kingdom." *(Early next session.)*

This notice is obviously very important to a great many persons. In my opinion, the law of "Royal Mines" is, to say, the least of it, very ambiguous, and the claims made under it by the Crown are very restrictive, and operate often very injuriously to the interests of private individuals, as well as to the revenues of the Crown.

I write this in the hope that some of your correspondents, from local knowledge, will contribute items of these peculiarities to the Journal, so as to afford as much information as possible bearing upon the subject.—*Aug.* 11. —— T. A. READWIN.

MINERAL WEALTH OF INDIA.

DISCOVERY OF ENORMOUS WEALTH IN THE HIMALAYAS.

SIR,—We have scarcely recovered from our surprise at the gold discoveries in South Africa, than we are informed that at last India hoists the flag "Excelsior," and promises to pour forth her immense mineral wealth, which has so long remained unknown or neglected. The discoveries of fabulous riches have not been brought to light, however, by Government or its officials, but by the skill and enterprise of one or two practised exploring mining engineers. Already the veteran Captain Henwood and his son are in charge of valuable mines of silver, antimony, and lead, at Sabathoo (not in British territory); and the Kulu Silver Mining Company are opening rich mines far higher up in the Himalayas, hitherto unknown or unexplored, in the Vazeeri Rupi and the Spiti Valley. Government have granted a lease of a rich mine of antimoniet of silver to Captain Calvert, near the Shigre Glacier, of fabulous wealth, solid lumps having been taken out, 3 ft. thick, of silver and antimony. The same gentleman, whose experience in the interior of Africa and other countries has familiarised him with venturesome explorations, has discovered 10 or 12 other mines in the Vazeeri Rupi, or siver country of the Wazeers, a part of the North of India, of almost uninhabited mountains, averaging from 8000 to 20,000 feet in height. Here, on the Parbutte River, are the hottest springs in the world, the natives cooking their food in them, and a few miles off the abandoned silver mines of the Seikhs. One of the mines opened yields lead, copper, silver, and gold in one ore, each metal being in full proportion, and in enormous quantities. The other mines are silver, antimony, and copper, all of great richness.

Capt. Calvert is said to have parted with half his mineral rights to the firm of Borrodaille, Schiller, and Co., for the modest sum of 50,000*l.*, an amount said to be small compared to the yield of ore and the vast territory over which the mineral rights extend, and which even now is only partly explored. This is the first instance of the Indian Government having granted mineral rights to anyone, except for coals. They monopolise the working of the salt mines, but have done wisely at last in opening the minerals of the country to English enterprise. It has often been a matter of wonder that India, said to be so rich, should have to import all her silver and copper from China; probably she will have to do so no longer; and who can say but, perhaps, another Calvert may re-open the famous Golconda Diamond Mines, and make them cheap as coals. T.

THE WESTMINSTER GOLD MINING COMPANY OF NOVA SCOTIA (LIMITED).

SIR,—Under the head of the "Gold Fields of Nova Scotia," a letter, dated Halifax, Nova Scotia, July 21, signed "Acadiensis," appears in the Journal of Aug. 7—the last paragraph of which, commencing "Laurencetown," contains statements which are incorrect, and injurious to the interests of this company; and we shall be obliged if you will insert this communication in your next Journal.

The Westminster Company, early in July, completed the purchase of the Werner Mining Property at Laurencetown, comprising 250 mining areas, from the registered owner, and the company was duly entered as the registered owner of the property. Upon the arrival of Mr. Robinson at the mines, on July 15, he was put in possession of the property. It appears that, in the meantime, differences had arisen between the vendors, and one of them opposed possession being given to Mr. Robinson, but without success. The litigation to which your correspondent alludes is not with the company, or their manager, or servants, but between the vendors themselves. The company have nothing whatever to do with the dispute. The works are not closed, as your correspondent states, but, on the contrary, are being actively pushed forward, and Mr. Robinson writes us, under the date of July 22, that he had four sets of men, each working double shift night and day.

A notice has since appeared in a Halifax newspaper, enclosed in a letter to us from Mr. Robinson, dated July 27, as follows—"WESTMINSTER GOLD COMPANY—COMMENCEMENT OF THE WORKS.—The property is now in full operation, and an eight-stamp crushing mill going day and night."

SHELFORD AND ROBINSON, General Managers.

Westminster-chambers, London, Aug. 11.

P.S.—Might we venture to suggest to your correspondent, "Acadiensis," to use a little more caution in giving circulation to damaging and incorrect reports?

MARIQUITA MINING COMPANY.

SIR,—Can nothing be done for the rescue of this company from immediate dissolution? Marmato yields a steady profit of 2000*l.* per annum. Santa Ana would pay a like amount, if the best ores were all exported. Yet the whole property seems lapsing to certain Bogota claimants for 20,000*l.*

Sir, myself a poor proprietor, I appeal to your sympathies to make the case known. In my little book, "New Granada, Equatorial South America," I give my advice. WM. LEAY, M.A.,

Sometime an officer of the Colombian Mining Association.

Vicarage, Downside, Bath, Aug. 9. ——

CWM DARREN.

SIR,—I see from the Journal that a meeting of the company is to be held soon for the raising of capital to prosecute this concern. I can only say that it is a pity it should be idle on such ground. The adit level, which was driven by a former party 50 fathoms south from the river, and only a few fathoms by the present company, is now within a fathom or two of the main lode of this and the Darren Mine; in fact, the end is now in that beautiful whitish jointy slate, so well known here as the channel in which the productive lodes run. The cutting of the lode in this may be the salvation of the concern, and although it seems within our grasp we are idle for want of funds to prove this point.

Aug. 11. —— R. WILLIAMS.

WEST CWMYSTWITH.

SIR,—In driving the deep adit east we have a fine, strong lode, composed of the most approved elements for the production of lead, while we occasionally break therein some good stones of that mineral. At this point we have about 10 fathoms to drive before we meet a cross lode inclining towards us, and as it is clear that the former workers have good ore at the intersection higher up the mountain, I feel confident we shall open a good piece of ground here. On the north side of the sett we have found old workings below, and to the south of the adit, for 50 fathoms in length, and as there is no evidence of any pumping appliances ever been used here, I infer those workings are not far below the floor of the level; and judging from the nature of this lode, and the solid lumps of lead found in the refuse, I am strongly of opinion that there is a course of ore here close at hand for 50 fathoms in length. The level has gone in from the bank of a brook, which would supply a never-failing water-power, and for a very moderate sum this part of the property can be developed to an extent to prove it of high value.—*Aug.* 11. —— R. WILLIAMS.

VIRTUOUS LADY MINE.

SIR,—In reference to the prospectus of this mine, which appears in this week's Journal, and my letter of last week, I have to state that the 1000 shares promised by me at 1*l.* each have been applied for. The great and intrinsic value of this property, and the daily development of the mine, is such that no more shares can be disposed of at that price. The present quotation is 2*l.*, and a limited number only will be sold.—5, *Abbey Mead, Tavistock, Aug.* 12. T. P. BARNARD.

[For remainder of Original Correspondence, see this day's Journal.]

INSTITUTION OF MECHANICAL ENGINEERS.

The members continued their excursion in connection with the Newcastle meeting by visiting Palmer's Shipbuilding and Engine Works, the Tyne Coal Company's Water Raising Apparatus at Hebburn, the Ferryhill Iron Works, and the Lead Mines at Allendale. The exploration of Palmer's Shipbuilding Works was commenced at the west end of the works near the blast-furnaces. The first object which attracted the attention of the party was the large double engine by the Lilleshall Company, of Shropshire, erected for the purpose of getting a current of air to the blast-furnaces, and thus early must have had a foreshadowing of the wealth of the place by the magnificent manner in which the engine is fitted. The beams were supported on massive pillars, painted in imitation of marble, and the floor, the walls, and ceiling were finished with corresponding excellence. The engine is of 250-horse power, 45-ft. beam, 9-ft. stroke, and makes 13 or 14 revolutions an hour; while its small cylinders are 48 in. in diameter, and its blowing-furnaces about 100. The four furnaces to be operated upon by this monster engine stood in a line alongside, and their excellent fittings and arrangements were deserving of all admiration. They were said to be able to produce from 18 to 20 tons of metal every 12 hours, having the Cleveland trap apparatus applied at the summits, and therefore, in order to see the effective working of this arrangement, many of the engineers ventured up the very steep incline on which the coke and ironstone are conveyed, and submitted, in order to satisfy their curiosity, to be nearly roasted by the tremendous sheets of flame which escaped whenever the fuel was inserted. From this place a move was made to the puddling-furnaces, where half-naked men dealt with the molten metal, there being here 48 to 50 furnaces in active operation, and the workers turning out 130 tons of the puddled iron every day of 24 hours. The process of purifying and solidifying the rough balls under the hammer, its subsequent passages through the rolling-mills, and its preparation into rails and plates, were also shown, but nothing gave greater pleasure and gratification to the visitors than the magnificent machinery by which the mills were kept in motion, and the cutting operations performed. A massive sheer-leg crane, erected on the quay, was proved during the afternoon to lift 100 tons. About 5000 persons are employed in the yard. Altogether, the works were in full play, and afforded one of the best illustrations of the resources of Tyneside that could possibly have been afforded. The CHAIRMAN (Mr. C. M. Palmer), in proposing "Success to the Institution of Mechanical Engineers," observed that this was the first occasion, he believed, that Jarrow had had the honour of entertaining that body, because when they last visited the North of England—eleven years ago—it was only a small village, unworthy of their notice. Now, however, things had changed, and he was proud to think that Jarrow stood second to no other manufacturing locality on the banks of the Tyne in its claims upon the notice of an intelligent and skilled class of men, who had proved themselves the champions of mind over matter. Every square yard along the busy banks of the river proved what the mechanical engineers had accomplished. Their business appeared to be to economise human labour, and in promoting that economy they were undoubtedly extending civilisation, and increasing the importance of their country amongst all other nations. By the skill and ingenuity of the people of this land, by their progressive intelligence and mechanical contrivance, England must ever continue as the great seat of manufacture in the world, and hence it was clear she would require all the coal she was able to produce for her own undertakings, and for the extension of her own greatness. And that greatness, he might add, was based entirely upon the ingenuity and intelligence of the mechanical engineers in making every man in this country not a means of labour, but a skilled and able director of machinery. They would see men performing labour that no human being ought to be expected to do; and, therefore, as a great body of mechanical engineers, they should never rest contented until they had substituted machinery for manual labour from one end of the works to the other, and made the artizan's occupation one that could be carried on without injury to him. He would not now detain them longer than to express the extreme gratification he felt at having had the honour to entertain the Mechanical Engineers of England, a body that stood pre-eminent over all others of the world, and, while wishing them every prosperity, to express a hope that they would again visit their hives of industry.

THE TYNE COAL COMPANY.

Upon the visit to Hebburn Quay to inspect the extensive machinery for unwatering the flooded coal fields of the district, the party were much indebted to Mr. Simpson for his courtesy. He explained why the gigantic operations had been rendered necessary. The mine—which was sunk in 1800, and is one of the oldest in the district—was flooded about 12 or 13 years ago, by the bursting of the tubbing in the shaft, and was for some time left to its fate; but being purchased by the Tyne Coal Company, some four years ago, they set themselves zealously to work to clear out the seams, and had now so far succeeded that hopes were entertained of a speedy recommencement of coal winning. The depth of the mine was 130 fms., of which 107 fms. had already been cleared; and, therefore, as it was now calculated that the winding engine gained upon the water at the rate of 4 ft. every 24 hours, and the feeders had been successfully overcome, there was no reason to anticipate any extraordinary difficulty with the remaining 23 fathoms. A new Cornish engine, with plungers attached, had recently been erected for winding up the water—being the only one in use in the district—and, as a quantity of 3500 gallons could thus be ejected per minute with the greatest ease, it was expected that no increase of the feeders could at all swell the water in the mine. It was stated during the visit that the old engine-beam broke in two halves while the men were employed in taking it down, and as no one was previously aware of the existence of any flaw it would, but for the erection of the larger engine, probably have gone on working until it was precipated down the shaft, as at Hartley.

ALLHUSEN'S CHEMICAL WORKS.

The extensive Alkali Works of Messrs. Allhusen was probably as instructive an excursion as any made. In most cases the operations were shown practically, and to aid the uninitiated in fully comprehending the descriptions given a synopsis of the processes, with the materials used and the products, was placed in the hands of each member. The department first visited was that in which iron and copper pyrites are burned. The raw material, imported from Spain, Norway, and Germany, was inspected, also the mode of crushing and preparing it for the burners. These latter, numbering about 180, are charged with the pyrites twice in the 24 hours, two charges consuming about 7 cwts. The amount daily burned is thus about 60 tons, the material producing about 41 per cent. of sulphur. The gas evolved during the burning of the pyrites (sulphuret of iron) is sulphurous acid, which is carried off into a series of sulphuric acid chambers, constructed of lead. By a somewhat complicated process, in which oxidising nitrogenous compounds are employed, sulphuric acid is produced. Nitrate of soda is decomposed by heat, and the nitric gas evolved passes with the sulphurous gas into the chambers, and sulphuric acid is formed. These chambers are 24 in number, and are each about 180 ft. long, by 21 ft. deep, and 20 ft. wide. In producing sulphate of soda and hydrochloric acid, chloride of sodium (common salt) is decomposed with sulphuric acid; the moisture driven off on evaporation and condensed being hydrochloric acid, and the solid sulphate of soda, from which two materials—bleaching powder and ball soda—are produced. In inspecting the latter process, the revolving furnace described in the paper read before the Institution on the previous day was brought under notice. This vast receptacle, which revolves horizontally, is charged with sulphate of soda, chalk, and coal, all well intermixed, and the materials are there subjected to a very fierce heat. The charge consists of from 2 to 3 tons. The furnace, when seen in operation previously, was moving at the rate of one revolution in five minutes, on what is called the slow motion. Every two or three hours, when the materials have been sufficiently roasted, the product—crude or ball soda—is brought, and carried away in barrows. Lixiviated, evaporated, and furnaced, this product (crude soda) becomes carbonate of soda, or unrefined alkali. To refine this material, it is dissolved in pure water, usually condensed steam; the liquid is pumped up into large iron tanks, and, after oxidising, and being allowed to settle for 24 hours, a fine alkali is left on evaporation. The chamber in which both crude soda and this refined alkali were stored having been visited, the process of making caustic soda was next explained. The crude or ball soda is lixiviated, agitated in a cistern with lime, purified by nitrate of soda, and evaporated. A pure, white soda is produced by exposing this to great heat, and thus burning out of it all the impurities it may contain. Carbonate of soda, taken again as a base, on being dissolved, and run into pans, crystallises and forms soda crystals, the ordinary soda of commerce. The process occupies about 18 days, and of this crystallised soda about 540 tons per week are produced at these works. From crystals of soda, exposed to carbonic acid in large leaden cisterns, and then dried and ground, bicarbonate of soda is produced—the material used as baking powder, and in the preparation of soda water. The last process described was that of producing chloride of lime (or bleaching powder). The party were next shown how the rubbish resulting from all these manufactures—amounting to about 7000 tons per month—is sent out to be deposited in the sea; and afterwards they visited the manufactory of fire-bricks, the smiths' shop, and the cooperage, and learned that upon the premises the company made its own gas and coke, repaired its boilers, and performed almost every necessary operation essential to the maintaining of so vast a concern. Lastly, the very complete and effective fire-extinguishing apparatus was exhibited in action, a pressure being obtainable of 140 lbs. per square inch on the metal pipes. To secure these against breakage, however, a well-contrived safety-valve has been constructed, which is ordinarily weighted to 75 lbs. By means, also, of a 14-horse power double-acting engine, a pressure of water even much greater can be obtained, a safety-valve in connection with it being weighted to over 200 lbs.

THE ROSEDALE AND FERRYHILL IRON COMPANY.

The visit to Ferryhill was a highly-interesting one, owing to several of the new inventions which have from time to time been described in the *Mining Journal* being in successful use at the collieries of the Rosedale and Ferryhill Iron Works and Colliery, the proprietors of which—Mr. James Morrison (Mayor of Newcastle), Mr. G. Leeman, and Mr. A. C. Sheriff, M.P.—accompanied the visitors over the property. The colliery is a new "winning," sunk recently to the coking seam known as the Harvey coal. The thickness of pure coal is about 4½ feet. Two shafts adjacent to each other, of 110 fms. deep, and 14 ft. diameter, have been sunk to the coal. The raising of coal began only on Wednesday last, and, consequently, the workings below ground have not yet been very widely opened out. Water, which is salt, is lifted from the pit at the rate of about 1800 gallons an hour. From the bank the coal is thrown over 5¾ screens, of which there are six, and the small coal is removed to coke-ovens, which are built in direct connection with the pit. The cages are attached to Omerod's patent safety overwinding apparatus, by which, should the rope be overwound, the cage becomes detached, and is maintained in its place. The pit is ventilated by means of the Guibal ventilator, a description of which was given in a paper read before the Institution by Mr. Cochrane. It is the largest fan yet erected in England for ventilating purposes, and is capable, it is said, of causing a current of 150,000 to 200,000 ft. of air per minute to pass through the workings. This fan attracted very considerable attention, and its efficiency was thoroughly tested in the presence of the engineers and others assembled. The extent of the workings being as yet comparatively small, the need of a rapid action on the part of the ventilator is unnecessary, and at present it is only performing 12 revolutions per minute, but the speed was for a few minutes increased to 60, in order that the visitors might judge of the effects of the fan. At this rate of celerity the periphery of the fan was calculated to perform close upon 1¾ mile per minute. It can be accelerated to 80 revolutions per minute, when the above-named work is expected to be performed by it. It was constructed by Messrs. Black, Hawthorn, and Co. The ventilator is of 36 ft. diameter, and 14 ft. in width. At 72 revolutions it gives a pressure on the water-gauge of 4½ in., and at 80 revolutions of 6¼ in. It is anticipated that the mine will yield 1200 tons of coal per day. The whole arrangements of the colliery were considered to be of the first order, both as regarded its engines and heap-steads, as well as the convenience of its roads and screening apparatus.

THE ALLENHEADS LEAD WORKS.

The excursion to Allendale and the works of Mr. W. B. Beaumont, M.P., was a great attraction, in consequence of the world-wide reputation of the "W.B." lead produced there. The Blackett level is an immense adit, which is to be seven miles long when completed, and extend from the town of Allendale to the mines at Allenheads; at present about one-half of the distance has been tunnelled. It is intended to drain the mines by means of this level, and it may also possibly be used for the conveyance of material and other purposes. At intervals along the dale shafts are sunk down to the tunnel; the first from Allendale Town is that at Studdon Dene, which is 13½ fms. deep; the second is at Holmes Linn, 32 fms. deep; the third at Sipton, 45 fms. deep; and the fourth at Breckon Hill, 71¼ fathoms deep. The shaft at the mines at Allenheads is 103 fms. 2 ft. deep. The mouth of the adit is 679 ft. above the level of the sea, and the main shaft at Allenheads 1400 ft. above the sea-level. The hydraulic winding and pumping machinery was explained by Sir William Armstrong. No steam is used for compression, but power is stored in a large accumulator, and used when required. After inspecting the large gin and the pumping-engine, the party adjourned to a meadow close by the river-side, where Mr. Westmacott explained the details of the new hydraulic boring-machine which he has invented and patented. In previous machines the stroke has been made by percussion of the boring-tool against the rock. This occasioned great liability to breakage of the instrument, and a rapid wearing smaller of the cutting surface. To obviate these defects Mr. Westmacott's invention places the boring iron close against the rock, and it is struck with a hammer, using a force of half a ton. The cutting end is shaped almost like the letter H, and a revolving action being given to the iron the hole made is a circular one. The blow given to the hammer is from a powerful spring, which is worked in a very ingenious manner, and can be set going with great rapidity. Upon a trial of its speed being made upon a block of hard stone, set up on the river's bank, it bored a hole of 9 in. in length in 2 min. 55 seconds. The machine is very compact, and comes within small compass. It is the only one at present in work, but so far its performance is understood to have been highly satisfactory, and it elicited expressions of the highest approval from several of the engineers present when it was shown. Upon the party arriving at the mines, Mr. T. Sopwith, F.R.S., C.E., chief engineer and agent of the mines, with Mr. Curry and other officials, gave a warm welcome to the visitors, and no time was lost in conducting them over the works at bank. First is seen the splendid hydraulic engine at the winding-house, constructed by Sir Wm. Armstrong nineteen years ago. Mr. Sopwith informed the visitors that it has been in continual use since the date of its erection on the spot, and that he "does not think it has cost a sovereign in repairs during that time." Then the processes for breaking, picking, cleaning, and separating the ore were witnessed in operation in a large range of buildings, after which the party adjourned to the chief engineer's room, where Mr. Sopwith gave a very interesting description of—

THE ALLENHEADS DISTRICT.

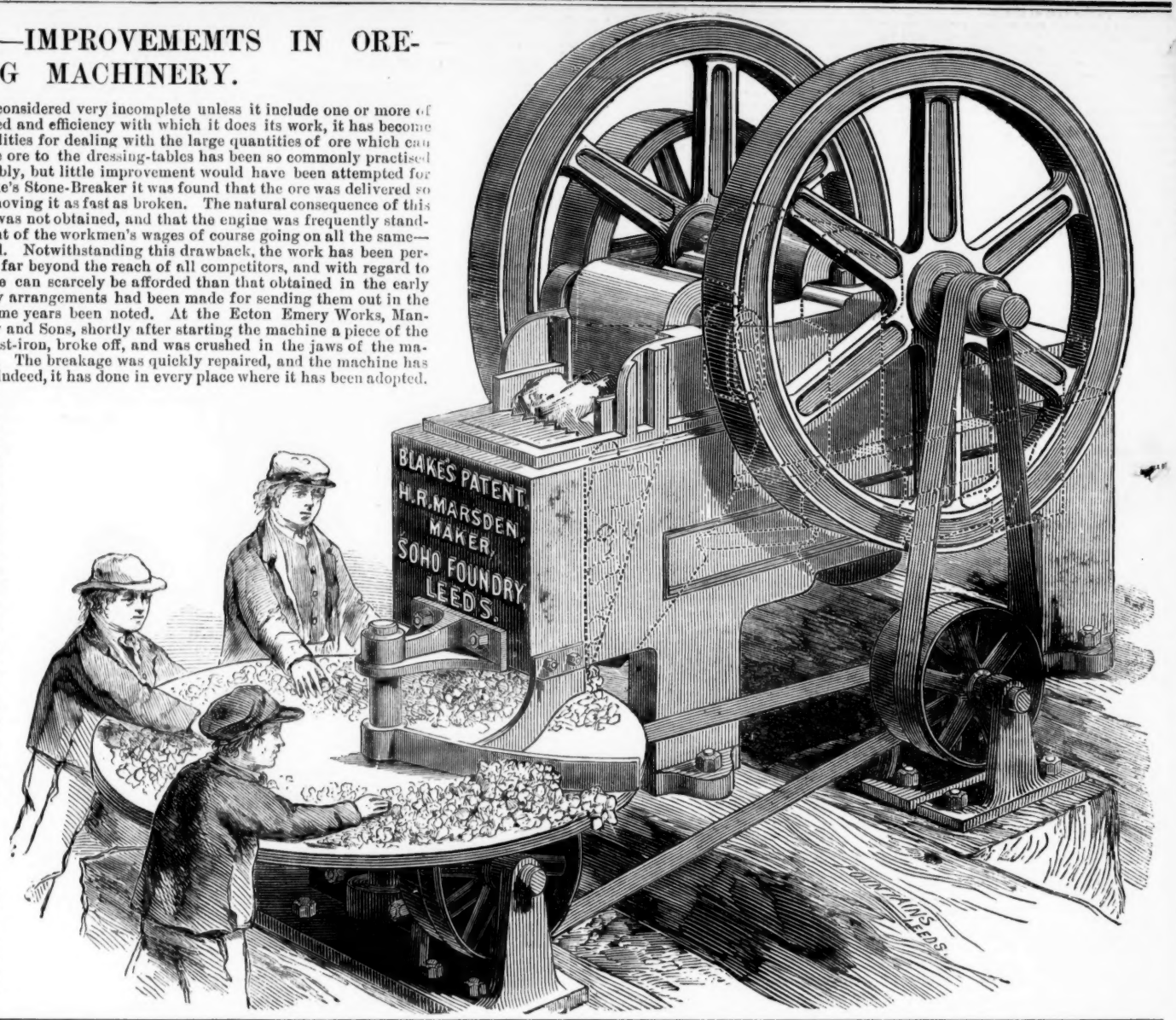
After carefully pointing out the position of Allenheads on the Map of England, Mr. SOPWITH proceeded to describe the geological features of the locality. With regard to the rainfall at the place, whereas in the greater part of the level ground of England the annual fall was from 23 to 25 in., at Allenheads they had from 50 to 60 in. per annum, and one year they had as much as 70 in. of rain. With reference to the geology of the district, he mentioned that if they looked at the strata best known to them—the carboniferous or mountain limestone, which laid below the coal at Newcastle—they would find that, although they had ascended a considerable height above the sea, yet the same strata formed the summit of these hills. At Crossfell, the bed of limestone—many feet below them where they now stood—cropped out to form the summit of the Pennine Chain. From a point near Cullercoats to the Pennine Chain—on a portion of which they were now standing—ran the well-known 90-fm. dyke. Soon after leaving the coast the dyke travelled in nearly the same direction as the Tyne, until it bore away and met the great Pennine fault near Crossfell. The ground about here had evidently been deposited level, and a gradual rise, as shown by the plans, had taken place. He pointed out, with the aid of suitable plans, the veins or fissures of the strata in which the ore was worked, and called particular attention to a remarkable subsidence which occurred a few miles from that place. Of the contents of those veins of ore the visitors might have formed some conception from their visit of that day. They found a good deal of amorphous and crystalline quartz, with some zinc and lead. The quantity of the metal produced from their works in a year, if placed along in 8-stone pieces, would reach nearly 100 miles. He then passed on to speak of the hydraulic machinery with which the works were fitted. The establishment of Sir William Armstrong, at Elswick, was formed about the time he (Mr. Sopwith) came to take the management of those mines, and he availed himself of the science and skill of that gentleman—or rather he recommended Mr. Beaumont to avail himself of them—and he could now point out that gin-engine, which had been at work for nineteen years with the same regularity as they now saw it, as a specimen of the work of the firm. And he might say that that was the general character of the entire machinery supplied by Sir William. At the last meeting of the Mechanical Engineers in Newcastle, he (Mr. Sopwith) took occasion to speak of the efficiency of hydraulic machinery, and he would now only say "ditto" to what he said then. The reservoirs by which water was collected for the use of their hydraulic engines were several in number—one of them was 8¼ acres in extent, and contained 16,000,000 gallons. The machinery employed about the immediate neighbourhood of where they stood, apart from the Blackett level engines, amounted to about 200-horse power. The Blackett level engines might be approximated at 300-horse power—so that they had about 500-horse power altogether. The number of accidents in the Allendale mines amounted to no more than about one life in two years. In conclusion, he referred to the importance of getting improved mechanical means for boring rock. At Holm's Hill they had seen the boring-machine invented by Mr. Westmacott, and he had to state that it had done very well during the time it had been in operation.

THE WALTHAMSTOW RESERVOIRS OF THE EAST LONDON WATER WORKS.—The members of the Geologists' Association, under the guidance of their President, Prof. MORRIS, of University College, London, made on Saturday another of those interesting geological excursions of which several have recently been reported in the *Mining Journal*,—the excavations now being made at Walthamstow for the new reservoirs of the East London Water Works being the locality chosen for examination and study. The excavation, nearly 150 acres in extent, for the northern reservoir was entered at the south-western corner, near Hellier's Ferry, the many excellent sections observable along the western side being first visited. Prof. Morris pointed out that one of the most important features to observe was that the beds occurred more or less in basins, so that although they were seen over a large portion of the area, they varied much in thickness. The gravel forming the bottom of the reservoir was an ordinary river-valley gravel, and contained remains of the elephant and bos primigenius; on this was a shelly marl, consisting of six or seven layers, covered by a bed of very black peat, so that, the necessary constituents being present, it was possible that under other conditions such deposit might have resulted in the formation of coal—the deposit contained a large number of land shells, and with these there occurred drifted and fallen trees and roots of trees. This is covered by a grey clay, which frequently occurs in thin beds, overlaid by a dark or brown coloured clay, in which can be observed the stems and roots of plants undergoing decomposition into what, in larger quantities, would be known as bog iron ore, and they would further observe that where this was exposed the decomposed vegetable matter was again undergoing decomposition into sulphate of iron. He explained that the mode of accounting for the conditions which they there saw was in a great degree confirmed by facts within the range of human history. The historical data of the state of this district may be found in some earlier records, but it appears that in the first and even middle periods of the eighteenth century the tract between the Roding and the Lea and the adjacent country was forest land to a large extent, with plenty of game and herds of deer. And just as they found in the lower beds—the old valley gravels—the elephant and bos primigenius, so in the superior beds they would find the sheep, horse, and ox. In the particular place they were then examining there had been found the red deer, the roebuck, the fallow deer, the moose deer, the wild boar in abundance, the wolf in abundance, the fox and goat in comparative abundance, and the beaver. There had also been found the remains of man, and of the implements used by him; they included bronze spear-heads, arrow-heads, and knives, a late keltic sword, part of the bronze sheath of the keltic dagger, and, what was very curious, an armlet of Kimmeridge coal; there was a bone knife of unknown age, a pierced axe-head of stag's horn, a stag's horn club, and various late keltic earthern pots. The general character of the deposits indicating the former and far greater extent of marsh land, as well as the course of the ancient river, its unequal depth, and the slow deposition of clayey, sandy, and shelly beds, many of the shells being fluviatile forms, as *Unio, Limnea, Cyclas, Bithynia*, associated with marsh and land genera, as *Succinea, Helix*, &c., probably washed in during floods, and deposited with the freshwater species. In the course of the examination of the beds, Prof. Morris pointed out many very interesting facts connected with the iron deposits. The iron, dissolved out from the vegetable soil, probably passed downward as a soluble carbonate, until meeting with the impervious bed of clay, its downward progress was arrested, as they saw it, and it there became re-oxidised; its form being what in large quantities would correspond with the better kinds of hema

PRACTICAL MINING—IMPROVEMEMTS IN ORE-DRESSING MACHINERY.

The ordinary machinery of a mine is now considered very incomplete unless it include one or more of Blake's Stone-Breakers, whilst, from the speed and efficiency with which it does its work, it has become almost a necessity to provide additional facilities for dealing with the large quantities of ore which can be treated with it. The labour of lifting the ore to the dressing-tables has been so commonly practised that little was thought about it, and, probably, but little improvement would have been attempted for years, had it not happened that in using Blake's Stone-Breaker it was found that the ore was delivered so quickly as to cause some inconvenience in removing it as fast as broken. The natural consequence of this was that the full advantage of the machine was not obtained, and that the engine was frequently standing—the consumption of fuel and the payment of the workmen's wages of course going on all the same—when it might have been profitably employed. Notwithstanding this drawback, the work has been performed at a price per ton which has placed it far beyond the reach of all competitors, and with regard to its really marvellous power a better evidence can scarcely be afforded than that obtained in the early history of the machine, before the necessary arrangements had been made for sending them out in the perfect state for which they have now for some years been noted. At the Ecton Emery Works, Manchester, belonging to Messrs. T. Goldsworthy and Sons, shortly after starting the machine a piece of the movable jaw, about 20 lbs. weight, chilled cast-iron, broke off, and was crushed in the jaws of the machine to the size fixed for crushing the emery. The breakage was quickly repaired, and the machine has continued to give the utmost satisfaction—as, indeed, it has done in every place where it has been adopted.

The power of the machine being sufficient to crush 10 tons of the hardest copper ore per hour, and, of course, to deal with a much larger quantity of less stubborn quality, it became most desirable to make arrangements for performing the picking operation with equal speed; and the ingenious and satisfactory way in which Mr. Marsden has met the requirements of the case will be readily seen from the annexed engraving. The stone-breaker is fixed in the usual manner, except that when necessary it is raised a little higher than usual, and to the front of the machine a stout iron bracket, which carries the top bearing of an upright spindle, on which the picking table rotates. Rotation is communicated to the table by band and pulleys, from the same main shaft that drives the stone-breaker, the change from horizontal to vertical rotation being effected, as usual, by means of a mitre toothed wheel and pinion. The size of the table and speed of rotation can, of course, be so arranged as to leave ample time for separating the ore from the refuse. But very little power is required to rotate the table, and the effect of the arrangement is that practically the ore supplied to the breaker is not only broken but thoroughly picked before it leaves it.



At the Edinburgh Show, just held, the merits of the machine has again been recognised by the award of the first-class medal for crushing machinery, and it is understood that Messrs. John Taylor and Sons, who had already adopted the machine, and whose adoption of an invention connected with mining is one of the best recommendations it can obtain, are so satisfied with its operation that they have given another order.

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tites, which, of course, was very valuable for the manufacture of iron. The fine blue was a pure phosphate, which would be worthless to the manufacturer, as the presence of phosphorus always caused the iron to be cold-short, just as sulphur made it red-short. The existence of the phosphate of iron in the position it there occupied could be accounted for by assuming that the phosphoric acid was derived from the animal matter above: there would be ample decomposition of animal matter going on to account for the quantity they saw. At the south-eastern part of the reservoir he directed attention to an interesting section, showing oblique bedding, and explained how the carbonate of lime was gradually percolating into the gravel, so that in process of time conglomerates would be formed, similar to the well-known pudding-stone. Upon leaving the excavation, the best thanks of the party were given to Mr. Campbell, the deputy engineer of the works, for the great courtesy he had displayed in conducting them over the works, and directing them to those localities where the sections could be best seen, as well as indicating the positions in which the various remains had been found. The party then returned to London, and dispersed well satisfied that in the four hours they had been under Prof. Morris's guidance they had acquired a vast amount of useful information, which could be turned to profitable account upon a future occasion.

MINING IN AUSTRALASIA—MONTHLY SUMMARY.

Australasian Gold.—It appears that the total quantity of Australasian gold imported into the United Kingdom in the first six months of this year amounted to 3,367,050*l.*, as compared with 3,203,940*l.* in the corresponding period of 1868, and 2,286,749*l.* in 1867. The receipts in June were valued at 818,422*l.*, as compared with 503,778*l.* in June, 1868, and 294,972*l.* in June, 1867.

A specimen of quartz studded with gold has been found at Waimuomata, beyond the Hutt (New Zealand); there are indications of extensive reefs. The value of the gold exported from Queensland in 1868 was 593,516*l.*, as compared with 189,248*l.* in 1867. The Rockhampton diggings (Queensland) are progressing steadily, a good deal of quartz mining being successfully conducted there. A reef has been registered by Fearon Brothers and others, five in all, about a mile due north from the Rosewood township. A shaft has been sunk to a depth of 53 ft., and it appears to average 10 in. to 12 in. in thickness. A parcel of 3 tons from this shaft was crushed at the Morinish Company's machine, yielding a cake of very dark-looking gold weighing 4 ozs. 13 dwts. The dark colour shows that there is an admixture of other metals, possibly lead or copper. Gold has been found, but in rather small quantities, in the Otorongo Valley, in the province of Wellington (New Zealand).

With regard to the gold fields of Otago (New Zealand), we may note the arrival of some 200 Chinese direct from China; these men are stated to be only the advanced guard of a considerably larger number who are yet to arrive. The miners at diggings lately opened on the Marewhenua river appear to be doing better than had been anticipated. Want of rain had impeded operations at Macraes; the reverse had been the case in the Domstan district, where there had been heavy rains. From the Lake district the accounts received were very encouraging; sluicing and tunnelling appears to be the forms of mining enterprise most generally adopted. The Blue Spur continues to maintain the foremost place as regards mining operations of any district in the province of Otago. The Colonial Government revenue from the gold raised in New South Wales in 1868 was 24,758*l.*, being a decrease of 572*l.* as compared with 1867.

Victoria.—The gold fields are yielding well. Godfrey's Creek has attracted a considerable number of miners from various quarters, who allege that the gold lies in patches, and is, consequently, difficult to be traced. Excellent returns are, however, made by some. A number of nuggets, unearthed at Berlin diggings, include one of 29½ lbs., one of 21 lbs., and many smaller.

Some geological discoveries of considerable interest have been recently made at El Dorada, in the Ovens district, by Messrs. Dunn, consisting of masses of brown sandstone, filled right through with casts of shells, the shells themselves having disappeared. The general appearance of all these boulders is that of lumps of mud thrown up from the bottom of a lake, and exposed to intense heat. One hill at El Dorado is completely covered with them at the top.

Sydney, June 15.—A number of diamonds, four gold nuggets, and rich quartz reefs, have been found recently.

Wellington, June 10.—A company is forming to work a gold-bearing quartz reef about 15 miles from this city. The news from the Thames gold fields continues good, and many rich yields have been reported.

Adelaide, June 19.—Mining matters, copper especially, very active; extensive discoveries in several directions. Between Port Augusta and the Blind-man some rich specimens of carbonates and oxides have been taken from the surface; the finder has had 4000*l.* offered for his discovery. A large number of new mining ventures are being started. Considerable interest has been taken in a new discovery near Kapunda. The local paper has the following on the subject:—"The attention of some practical miners has lately been directed to a section formerly belonging to the Australian Mining Company, as presenting every appearance of containing a good mine. The sections in question had been tried in places by the company, who eventually sold the property to Mr. James White, reserving, however, the mineral rights. This particular section is now held by Mr. Fotheringham on a lease with right of purchase, and on it has been discovered a very fine lode at the surface. A pit has been sunk 6 feet deep, and the lode so far continues to improve. A number of the tradesmen of Kapunda have subscribed the necessary capital to test the lode, with a view to obtaining a lease should the result be favourable. We have seen some good specimens of oxides and carbonates from the lode, one of which, assayed by Mr. J. Rowe, gave a return of 36 per cent. for copper. A second sample, from stuff deemed almost worthless, gave a return of 16 per cent."

AUSTRALIAN MINES.

Yudanamutana Copper (South Australia).—Adelaide, June 21: The results in the smelting department for the month ending May 31 have been 48 tons of metal made. Contracts for 11,500 tons of wood have been let, at 10s., 11s and 12s. per ton, with the opportunity of letting a much larger quantity at the same rates." As regards the railway, the following is from the *South Australian Register*, of June 19:—"Progress is being made in the colony towards the carrying out of the Port Augusta and Northern Railway. Engineers are now going over the proposed route, prior to the representative of an English company signing agreements with the Government." Captain Terrell reports, under date June 12:—"No. 1 Winze: The lode still holds good; no difference in its appearance since my previous reports.—No. 3 Winze: The stopes north and south, in back of the 25 fm. level, are yielding good ore; the floors of ore are still extending, and looking well.—Stopes South of No. 1 Winze: The lode in this place is still going down, and turning out good ore; whilst those in back of the 10 fm. level, south of No. 3 shaft, are looking as well as my last report stated. Copper ore raised in the month, 455 tons; smelted, 455 tons; Copper made, 48 tons. Dispatched to Port Augusta, 46 tons 13 dwts. 2 qrs. The lodes and stopes of ore in every part of the mine are looking well. We have had abundance of rain, and there is a good season before us. The mine is still improving, and everything going on satisfactorily."

Worthing.—Thomas Prisk, June 19: I have very little to say in my report this month, as we have not cut the lode at the 93, but, according to the cross-cut in the level above, you know we cannot have far to drive. We are now in above 11 fms., and every prospect of a good lode, when it is cut, from the nature of the ground. You will remember that in some of the cross-cuts at the upper levels we have paid above 30*l.* per fathom for driving, but in the 93 the highest price we have paid is 10*l.*, and that for only 1 fm.; the remainder has been driven at 8*l.*, 7*l.* 10s., and 7*l.* per fathom; in fact, the ground about the 93 appears to have made a complete change for the better, both as to the price for working and also promise for ore. In the last 3 or 4 fms. driving we have met with several branches of rich ore and soft sugary-spar, prian heads, and peach, which are strong indications of copper in the Bremer. We have holed the rise, and put one pare of men to drive north at the 63, but the lode here is not very good, the shoot of ore being just above us, and dipping north; we hope to meet with it in driving 2 or 3 fms. We continued driving at the 73, south of the slide, part of the month, but no improvement since my last report. We have been obliged to take the men out of this place for the time, and put them to break ore, but hope to resume driving as soon as possible. We have commenced to sink a winze under the 63, at the junction of the great slide and the lode, which at present looks very promising; the lode, though rather hard, is good for ore. The stopes are about as usual as to richness. The quantity of ore raised and sampled for the month is about 140 tons, of about the usual quality. Part of this small sampling is owing to the delay in forking the water. After we fixed the new plunger at the 93 one of the clacks slipped on one side, which caused great trouble and expense. I was for several days afraid that we should lose the lift altogether, but am now thankful to say we have put it all right again, and saved the lift. Number of hands employed about the same as last month. At present I have nothing more to say, but hope in my next to be able to write a far better report.

Port Phillip and Colonial (Gold).—Mr. Bland, Clunes, June 17: "The quantity of quartz crushed during the four weeks of May was 4835 tons; pyrites heated, 85 tons; total gold obtained, 1931 ozs. 1 dwt., or an average per ton of 7 dwts. 23¾ grains. The receipts were 724*l.* 18s.; payments (including 380*l.* 11s. 6d. spent on firewood account, and 278*l.* 9s. 4d., the amount of invoces of stores), 526*l.* 18s. 5d.; profit, 198*l.* 19s. 8d., added to which was last month's balance of 96*l.* 8s. 10d., thereby making an available balance of 207*l.* 8s. 6d. The amount divided between the two companies was 200*l.*, the Port Phillip Company's proportion of which amounts to 130*l.* The balance of 77*l.* 8s. 6d. was carried forward to next month's account. The following is the return for the first two weeks of June. Quartz crushed, 2602 tons; pyrites heated, 50 tons; total gold obtained, 1051 ozs. 10 dwts., or an average per ton of 8 dwts. 2 grains. Remittances, 1293*l.*"

English and Australian (Copper).—Port Adelaide, June 21: The stock of coal on hand was about 2844 tons. There were four furnaces and one refinery at work at Port Adelaide. At Kooringa the fires were all out. The 150 tons of copper advised as in the course of shipment had been shipped, and another 150 tons were in course of shipment.

Australian United (Gold).—Mr. Kitto (June 19) writes—"Duke of Cornwall Mine: I have just tried the stampers (24 heads), and they work admirably. Although everything is not yet complete for steady work, yet I hope to advise you in my next of the result of the crushing of 700 to 800 tons of stone. I have commenced a new shaft, which the captain named 'Kitto's,' and will send you a tracing showing its position, &c., by the next mail. Dauke's shaft is very hard, only 13 ft. having been sunk during the month, but the ground is getting much easier. We have cut the 'Magazine' lode in the eastern cross-cut; it looks well, and is a great addition to our gold-bearing quartz. This lode underlies very rapidly to the west, carrying a beautiful flookan on the east side. According to the course now being taken by this and Cattle's lodes they will make a junction at a depth of another 100 feet. These lodes appear to be approaching each other much faster than I at one time supposed, and I shall be most anxious to get deep enough to find the junction. It is due to the shareholders that this mine be in full working order within 18 months from July last year—the time we commenced. I shall be in that position by Christmas.—Central Mine: Owing to the late rains the masons have been impeded in their progress. I trust, however, to be at work before the next mail leaves. The pumps are fixed in the shaft, and the preliminary works approach completion. I trust to be able to satisfy you as to the value of this property before the January meeting of shareholders."

Scottish Australian.—The directors have received advices from Sydney, dated June 16, with reports from the Lambton Colliery to the 15th of that month. The sales of coal for the month of May amounted to 12,191 tons. Mr. Morehead, the superintendent, had visited the colliery, and reports that matters there generally were progressing satisfactorily.

Yorke Peninsula.—The directors have received advices from the committee of inspection of the company at Adelaide, dated June 21, with reports from the Kurilla Mine to the 18th of that month. The report from the mine states that—"The engine was set to work on May 22, and the water drained to the 25 fm. level, so as to allow the pitmen to screw down and secure the stuffing-box of the plunger-pole at that level. This done, and the consent of the directors obtained, the engine was again turned idle, while the new tubular boiler was being removed from the Duryea Mine, and fixed at the Kurilla. This is completed, and the water again drained to the 35, or bottom level, the shaft put into repair, and everything made ready for the men to commence cutting the plat, preparatory to sinking Hall's engine-shaft; and I would call the attention of the directors to the present shaft, plant, &c., as representing so much capital—not lost—but available. And I have no doubt of its being valued, at no distant date, at the full cost—in other words, I believe that they have only to sink and drive on the course of the lode at and from the engine-shaft to realise the objects with which it was sunk at first."

FOREIGN MINES.

Imperial Silver Quarries.—July 19: 22 ft. of tunnel were made last week.

Cape Copper.—June 26: Heavy rains had fallen in Namaqualand, and it was anticipated that a favourable carrying season would set in by about the middle of July. The Cape Town agents write (July 3)—"The prospects of the riding season in Namaqualand are more promising than anything we have had for many years, and there is little doubt a large quantity of ore will be got down during the next few months." The mule disease appears to be dying out. The superintendent writes—"The splendid rains with which the district has been blessed have induced me to direct that the whole of the available lands at Modderfontein be ploughed up, and I have hope that the results will be profitable." The mining reports will, as usual, be sent by the following mail, but the superintendent remarks—"Water has been making so fast in the engine-shaft at Ookiep, in consequence of the late heavy rains, as to stop operations for a time in the 40 fm. level." Good labourers are being obtained from Cape Town, and large numbers of natives, owing to the distress existing in the neighbouring districts, are arriving at the mines, and are being employed in general work, as far as it can be conveniently given to them. The Croydon was loading a cargo of Hondeklip, and bills of lading for 25 tons, per Saxon, are received.

Capula Silver.—Capt. Paull (Capula, July 6): The net value of the last three bars of silver, torta No. 5, of 297 marcs (2376 ozs.), sent to Mexico amounted to $2659·98. Torta No. 6, of 15 montones, is in beneficio, but it was delayed being incorporated on account of the rains. The assay is 20 marcs per monton, or 120 ozs. to the ton. According to the mine assay it should have been 22½ marcs (135 ozs. to the ton). I shall get it repeated. We have not yet finished sending in for torta No. 7, on account of the heavy rains. There is sufficient metal in the ore yard for two tortas of 150 cargas (about 20 tons), each of which we shall send to the hacienda as soon as the weather will permit. I have purchased 450 lbs. of quicksilver, to be delivered at El Chico at $66 per quintal, cash.—Mine: I mentioned in my last that the shaft was sunk to the level, where we intended to drive a cross-cut north to intersect the main lode, which we should have commenced after squaring, but unfortunately the wire-rope broke twice, and there were only three strands left holding in another place, which we had to cut, take out, and replace by a wood rod, during which time the water rose up to within 5 varas to the adit level. The water is in fork again, and next week, I trust, we shall commence the cross-cut. San Jorge rise is still looking well, producing very fair quality ore; the greater part is smalls, from 16 to 20 marcs per monton, or 96 to 120 ozs. per ton. There are 24 men employed working six stopes, three east and three west of rise. Nos. 1 and 2, both east and west of the rise, are the best, producing metal from 15 to 30 marcs per monton. Last week (although Tuesday was a feast day) they broke 600 castales of ore, which (say, 5 castales to a carga) will amount to 120 cargas, or 16 tons 1½ cwts. more than has been broken in one week since the company took the mine, and that without raising any from below adit. In the end driving west from La Bomba to communicate with San Jorge rise for ventilation the branch has greatly improved. During the last week they broke 5 castales of very good ore, which I consider to be about 1½ cargas, as it was very clean.

Anglo-Italian.—Mr. Pearson Morrison reports—Fair progress has been made, and an average return of ore from Frisa and Assino galleries. The exploratory works have been somewhat curtailed, occasioned by want of men, and the concentrating of our force as much as possible on the points most productive.—Gallery Frisa: The ends north and south from the bottom of No. 1 winze continue to improve both in quantity and quality.—Gallery Assino: The same favourable indications of last month continue. The lode both in the winze and end turning out most satisfactory. We are now driving south from the bottom of the winze, which has now a depth of 20 metres. Another winze in a similar shoot will be commenced on the south of same, so as to give better communication, and to open out a large field of stopes. This part of the mine looks most promising, and I anticipate a handsome monthly return of ore from it when sufficiently opened out. The machinery has arrived at Genoa, and will be forwarded in a few days. Mr. Dietzch reports that the reduction building is in a fair state of advance; the wheel-pit, the most difficult part of the whole, stands entirely finished, the main wall will likewise come to a close in the course of another week.

[For remainder of Foreign Mines, see this day's Journal.]

Improved Turbine.—Messrs. Hunt, Waite, and Flint, of Orange, Mass., have invented an improved turbine, which gives considerably over 80 per cent. of effective power. The new turbine is described as having ample feed and buckets well arranged for delivering; it is very simple, not liable to get out of order, has few parts, and great facility for shutting off.

Production of Gas Tar Prevented.—Messrs. Arthur Baudesson and Paul Houzeau have succeeded in preventing the formation of tar in the manufacture of lighting gas, and in obtaining at the same time from 30 to 40 per cent. more in quantity, as well as great increase in the lighting power of the gas produced. They thus avoid the numerous inconveniences of tar, such as encumbrance of the work, interference with the distillation, danger from fire, &c., which are not nearly compensated by the profits obtainable from the sale of the product.—*La Houille.*

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